DEPARTMENT OF CIVIL ENGINEERING

MINOR I :CEL864 STRUCTURAL HEALTH MONITORING
(2016-17)

Time allowed: 1hour
Venue : LH 619

Date : 03 February 2017
Max marks : 15

NOTE: (a) This question paper contains one page only. (b) All questions are compulsory. (c) **Assume any data which you deem is necessary but not supplied. (d)** Draw neat and clear sketches wherever required.

Question 1.

Define piezoelectric strain coefficient, what are its units. How it can be practically measured?

(**2 marks**)

Question 2.

Compare and contrast ESG and PZT sensors for their suitability for measurement of static and dynamic strains.

(**3 marks**)

Question 3.

Differentiate between thermisters and RTDs.

(**3 marks**)

Question 4.

A PZT beam of size 100x10x1 mm is hanging vertically with a thread from a support. Compute the induced strain under an electric potential difference of 200 V. No other force is applied on the beam. Assume electric permittivity = 2.12×10^{-5} F/m , piezoelectric strain coefficient = 2.10×10^{-10} m/V, Young's modulus of steel = 200 GPa, Young's modulus of PZT patch = 6.67×10^{10} N/m^2 .

(**4 marks**)

Question 5.

Compute the strain measured by an ESG if a change of resistance 0.05 ohms is observed against a base value of 120 ohms. The gauge factor is 2.16. What shall be the resolution of strain measurement if the digital multimeter used for this purpose has a resistance measurement resolution of 10^{-3} ohms.

(**3 marks**)